

CLAIMS

1.- A cluster for adjusting a pressurised water nuclear reactor comprising a bundle of neutron-absorbing rods (2), each comprising a metal tube (4) called cladding which is sealed off at its upper extremity by a top end plug (6) and at its lower extremity by a bottom end plug (7) and a support (3), or spider, of radiating shape, to which the absorber rods (2) are attached through their top end plugs (6), characterised in that the cladding (4) of some at least of the absorber rods are weld-free hafnium tubes, the top end plugs (6) of the absorber rods (2) having hafnium cladding being of a titanium-based alloy and welded to the part of the top extremity of the hafnium cladding (4) of the absorber rod (2), and the bottom end plugs (7) being of massive hafnium and being welded to the bottom extremity of the hafnium cladding (4) of the absorber rod (2).

2.- A cluster for adjustment according to Claim 1, characterised in that the top end plugs (6) of the absorber rods (2) having a hafnium tube (4) are of TA6V or TA3V2.5 titanium alloy.

3.- A cluster for adjustment according to Claim 1, characterised in that protection against wear of the rods is provided by oxidation at a temperature of 1300°C to 1700°C in an oxidising atmosphere, with travel at a rate of 50-250 mm/min over the cladding (4) welded to the bottom end plug (7).

4.- A cluster for adjustment according to Claim 1, characterised in that protection against wear of the top end

plugs (6) made of titanium alloy is obtained by treatment in a static furnace in an oxidising atmosphere under conditions ensuring that the properties of the titanium alloy persist.

5.- A cluster for adjustment according to Claim 4, characterised in that treatment in a static furnace is carried out at a temperature of between 550°C and 850°C for a period of between 2 and 12 hours.

6.- A cluster for adjustment according to Claim 1, characterised in that one at least of the top end plugs (6) and bottom end plugs (7) are welded using at least one of the following procedures: friction welding, resistance welding, TIG welding.

7.- A cluster for adjustment according to Claim 1, characterised in that the hafnium used to manufacture the cladding (4) and the bottom end plugs (7) contains more than 300 ppm of oxygen.

8.- An absorber rod of a cluster for the adjustment of a pressurised water nuclear reactor, characterised in that it comprises a cladding (4) of hafnium, a top end plug (6) of titanium alloy welded to an upper extremity of the hafnium cladding (4) and a bottom end plug (7) of massive hafnium welded to a lower extremity of the hafnium cladding (4).

9.- A cluster for the adjustment of a pressurised water nuclear reactor, comprising a bundle of rods (2) and a support of radiating shape called a spider (3) to which the absorber rods (2) are fixed through their top end plugs (6),

characterised in that the spider (3) is made of titanium-based alloy.

10.- A cluster for adjustment according to Claim 9, characterised in that some at least of the absorber rods (2) in the cluster (1) comprise a hafnium tube (4) and a top end plug (6) of titanium alloy welded to the top extremity of the hafnium tube (4).

11.- Process for protecting an absorber rod according to Claim 8 against wear, characterised in that the cladding (4) of the absorber rod (2) is oxidised at a high temperature in an oxidising atmosphere.

12.- Process for protection according to Claim 11, characterised in that oxidation of the cladding (4) welded to the bottom end plug (7) is carried out in a travelling arrangement at a temperature of 1300°C to 1700°C at a rate of 50 to 250 mm/min.